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ABSTRACT

When basic instructional design issues (goals, nature of the subject matter, and needs of the learner) are taken into consideration, different distance learning models may emerge as appropriate for different learning situations. A systematic approach to design and development of instruction allows for viewing the instructional process as a set of interrelated components: planning, implementing, and evaluating. With appropriate planning, many missteps can be avoided. Consideration of the following basic instructional design questions can lead to resolution of many of the important issues in planning for distance education: (1) "What is the overall instructional aim?" (2) "Who are the learners and where are they located?" and (3) "What sorts of learning experiences should the learners have?" This approach led to different models of distance education at Purdue University (Indiana), illustrated by examples from the Northwest Doctoral Cohort Program in educational administration, a graduate course in educational restructuring, and preservice teacher initiatives. (AEF)

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Distance Learning Models for In-Service and Pre-Service Education

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Distance learning is emerging as a critical opportunity and challenge for institutions of higher education throughout the United States and the world. With growing pressure to provide distance learning opportunities, many institutions of higher education are rushing to put courses and programs into place. But, what sorts of distance learning experiences are appropriate? What delivery systems will best meet students' needs in a particular situation? These are fundamental instructional design questions that are best answered by applying a systematic approach that takes into account the subject matter and students' needs. This paper focuses on models of distance learning that emerge from application of systematic instructional design concepts to instructional problems. Examples of distance learning for in-service and pre-service teacher education, taken from the authors' own experiences, are highlighted.

Today, we are experiencing a boom in distance learning. The traditional college student population pool is beginning to decline, but opportunities for reaching non-traditional students are expanding. As a result, universities are pursuing distance education with increased vigor. The U.S. Department of Education (1997) recently released a survey of distance education college courses. According to the survey, in the fall of 1995 a third of all higher education institutions in the U.S. offered distance education courses, led by 62% of public four-year institutions. A total of over 25,000 distance education courses were offered in the 1994-95 academic year reaching over three-quarters of a million students; 45% of that total was offered by public four-year institutions. The most popular delivery methods reported were two-way interactive video (57%) and one-way video (52%). However, one-way video with two-way audio and the Internet were each reported by about a quarter of reporting institutions. While attesting to the growing popularity of distance learning, this survey almost certainly fails to capture the full extent of current efforts because, for example, of the rapid growth of the World Wide Web and delivery of Web-based distance learning in just the past two years.

Because of the pressure to provide distance learning opportunities, institutions of higher education are rushing to put courses and programs into place. Our institution, Purdue University, is no exception. Although Purdue has a long history of distance learning initiatives, a new Office of Distance Learning was created just within the past year, and there are many efforts underway to develop new distance education courses and programs across the campus. But, what sorts of distance learning experiences are appropriate? What delivery systems will best meet students' needs in particular situations?

Planners of distance education must consider the choice of media and methods in light of the potential impact on student attrition, the quality of the experience, its educational status, and cost (Keegan, 1990). Fundamentally, questions about appropriate distance education approaches and methods are questions of instructional design. These fundamental instructional design questions are best answered by applying a systematic approach to the development of instruction that takes into account the nature of the subject matter and needs of the learners (Cyrs, 1997; Dick & Carey, 1990; Newby, Stepich, Lehman, & Russell, 1996). While there seems to be a tendency today for people to jump on the bandwagon of whatever is the latest technology, a systematic approach to instructional design calls for matching media and methods to the needs of a given situation and group of learners. By asking basic questions at the outset, it is possible to identify appropriate models of distance learning that fit the situation.

Applying Instructional Design to Distance Learning

When taking a systematic approach to the design and development of instruction, one can view the instructional process as a set of interrelated components. On a simple level, these components form a PIE model — planning, implementing, and evaluating (Newby, et al., 1996). Planning focuses on designing instructional materials and learning experiences to meet the specific needs of the learners, the content, and the context. Implementing puts into practice the plan to help the learners achieve their

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learning objectives. Evaluating involves assessing the level of learning achieved by the learners and/or the effectiveness of the instruction.

Let us focus in particular on the planning component of this process because, with appropriate planning, many missteps can be avoided. Dick and Carey (1990) elaborate that the initial planning steps of the process should include: identifying an instructional goal, analyzing the type of learning required of the learners, and analyzing the characteristics of the learners. These planning steps can be addressed by asking:

- What is the overall instructional aim?
- Who are the learners and, in the case of distance education, where are they located?
- What sorts of learning experiences should the learners have?

By answering these three questions, many of the important issues in planning for distance education can be resolved. For example, if the overall instructional goal is the transmission of basic information, any of a variety of relatively simple media (e.g., print-based correspondence material, videotapes, the World Wide Web) might work just fine. However, more complex aims would likely lead to a need for more complex and interactive distance learning technologies.

Likewise, the nature of the learners and their locations has a significant impact on the planning process. Novices in the use of computer, for example, are likely to be poor subjects for a Web course. We learned this the hard way when, some years ago, we made our first attempt at using computer-mediated communication (CMC) for delivery of an introductory computer class to inexperienced in-service educators. While ultimately fairly successful (Cheng, Lehman, & Armstrong, 1991), the course was fraught with difficulties because the inexperienced users were not able to use the computer network effectively. The medium must be able to reach the learners where they are located, and it should match the characteristics of the learners.

Finally, it is very important to consider what learning experiences you want the learners to have. In face-to-face instruction, nearly the entire repertoire of instructional strategies is available to the teacher. You can make presentations, perform demonstrations, or have class discussions. Students can work with computer software or view videotapes. Students can be teamed to work cooperatively, and so on. At a distance, some strategies are almost always constrained by the limits of the technology. So, it is important to ask, which are the most critical learning activities? If demonstration is a crucial element of the learning process, as it might be in a woodworking class, then the distance learning medium must support that; videotapes or live video might satisfy such a requirement. If discussion is a key element of the learning experience, then having appropriate tools for communication becomes an overriding consideration of the distance learning system.

Models of In-Service Distance Learning

Let's examine how consideration of these basic instructional design questions has led to different models of distance education at our university.

Northwest Doctoral Cohort Program

Launched in 1995, the Northwest Doctoral Cohort Program is a special graduate program in educational administration. (See: http://www.soe.purdue.edu/cohort/home.html.) Let's examine the three key questions and how they were answered for this program.

What is the overall instructional aim? Broadly stated, the aim of the program is to help school administrators simultaneously become certified for a school superintendent's license in the state of Indiana and obtain a Ph.D. degree.

Who are the learners and where are they located? The learners in this program are individuals seeking to become school superintendents. In most cases, these individuals are already school administrators, e.g., building principals, assistant superintendents. The greatest concentrations of school administrators can be found where there are the greatest concentrations of schools and people. In our state, that means the Indianapolis metropolitan area or northwest Indiana near Chicago. Both sites are distant from the Purdue University main campus.

What sorts of learning experiences should the learners have? At the advanced level, educational administration is largely an issues oriented field of study. While there is content (e.g., school law, finance), much of the curriculum deals with issues of leadership and the problems of managing the large educational enterprise of a school district. As a result, it is important for the learners to see examples of a variety of problems and issues, grapple with them, and come to appreciate new perspectives on them through discussion and reflection.

So, what does this tell us about the nature of this program? In this case, several factors together affected the decision to structure this distance learning experience in the way that it now exists. Because of the concentration of potential students, the decision was made to begin the program in northwest Indiana. This decision was supported by the fact that Purdue University's Calumet regional campus is located in the area. Because the Calumet campus is not authorized to grant Ph.D.'s in educational administration, a distance learning program was conceived. But, what sort of program would it be?

School administrators are busy individuals. Because of the distance to the Purdue University main campus, travel to the main campus was out of the question. So, the decision was made to offer classes early in the evenings at the regional campus. Because of the need for these

individuals to grapple with issues and see a variety of perspectives, a cohort program was devised. Participants move through the program as a group, and the individuals become resources for each other. Further, in order to permit a high level of dialog and discussion in classes, two-way interactive video is used to deliver the courses to the regional campus. As a result, the instructor on the main campus and the members of the cohort group on the regional campus can discuss issues and present materials as if they were all together in the same room.

This example illustrates how consideration of the basic instructional issues can lead to a decision to structure distance learning in a particular way. In this case, the model is composed of a coordinated sequence of courses, delivered from the main campus to a regional campus by means of two-way interactive video. In the last year, the program expanded to include a site in the Indianapolis area so that it now reaches both major population centers in the state.

Topics in Educational Restructuring

Other programs offered via distance learning have relied upon other approaches. Beginning in 1993, one of the authors has taught a graduate level course EDCI/EDFA 591, Topics in Educational Restructuring. (See: http://www.soe.purdue.edu/~lehman/edci591/intro591.htm). Let's examine how the answers to the basic questions compare in this example.

What is the overall instructional aim? The aim of this course is to give interested individuals the opportunity to learn more about the many issues and concepts involved educational reform and restructuring.

Who are the learners and where are they located? Unlike the Doctoral Cohort Program, the learners in this course can be quite diverse. Individuals interested in course topics often include: school administrators, in-service teachers, curriculum coordinators, college faculty, and education graduate students. Students can have varying backgrounds, abilities, and schedules. They can be located almost anywhere from on campus to schools within the state to more far-flung locales.

What sorts of learning experiences should the learners have? The issues surrounding educational reform are complex and intertwined. To give students an opportunity to come to grips with the concepts and issues, they need to read current literature in the field and interact with others to encounter multiple perspectives. What is needed is something like an on-campus seminar but at a distance.

Given these considerations, what is the nature of this distance learning model? In this case, the factors that influenced course design included: participants' schedules and locales, course content, and the need to approach topics from a variety of viewpoints and in depth. The methodology that was chosen was computer-mediated communication (CMC). CMC has been touted as an excellent medium to promote meaning making in distance education (Jonassen, Davidson, Collins, Campbell, & Haag, 1995).

CMC provides a mechanism for extended dialog on topics. With it, we could reach participants who had access to a computer and a modem almost anywhere. When we first began the course, we used a computer network called IDEAnet that was available to any educator in Indiana through toll free dial-up access (Lehman, McInerney, & White, 1993). We purposely chose to use the "lowest common denominator" technologies — mainly e-mail — because, when we first started, 2400 baud modems were the norm. Readings were initially supplied as a print packet that was mailed to participants. As the Internet matured, the course matured and changed with it. As a result, in a recent offerings, we have had participants from as far away as Norway, and we have been able to rely on readings available on the Web rather than printed copies of articles. A Web site now supports the course, although the heart of the course, the on-line discussion, still takes place through e-mail. For our educational goals, the discussion remains our primary vehicle for learning.

These examples illustrate how different distance learning solutions may emerge when basic instructional design issues are considered at the outset. By applying systematic approaches to the selection of media and methods, we can arrive at appropriate solutions for particular situations. While these examples have addressed in-service education, we have extended the concepts to pre-service education as well.

Applications to Pre-Service Teacher Education

We can examine our pre-service teacher initiatives by first looking at the same basic instructional design questions. What is the overall instructional aim? Distance learning is clearly rise in K-12 education as well as higher education. Therefore, our basic aim in these initiatives is to give our teacher education majors exposure to and experience with common distance education methodologies. Who are the learners and where are they located? Our students in these initiatives are on-campus teacher education majors. What sorts of learning experiences should the learners have? At a minimum, we want them to experience distance education methodologies as learners. If possible, we want them to also leave our program having had some experience teaching at a distance.

Several projects are underway. With the success of e-mail and the World Wide Web, a number of our on-campus courses now make use of e-mail discussions to extend dialog beyond the confines of the class period. In another project, education students at Purdue use electronic mail and UNIX chat to tutor students in a community about two hours from the Purdue campus. In addition, one of the classes in the Northwest Doctoral Cohort Program enrolls undergraduate students who are pursuing a computer

teaching endorsement on the main campus. This gives these students first hand experience with the two-way interactive video. Therefore, students have opportunities to experience a variety of distance learning environments.

The most extensive pre-service teacher experience in distance learning takes place in EDCI 260, Introduction to Computers in Education. This course is an undergraduate elective (soon to be required) in educational technology with an enrollment of about 150-250 students per year. During the 1996-97 academic year, a major initiative was launched with funding acquired by school-based colleagues Kathleen Steele and Dawn Colavita in the Crawfordsville Schools, Crawfordsville, Indiana, a community about 45 minutes south of the Purdue main campus. In Indiana, many K-12 schools have two-way interactive video distance education capability through Project Athena, a statewide initiative supported by equipment grants from Ameritech. The Crawfordsville Schools have the nearest Project Athena site to Purdue. They worked with Purdue to initiate this project as a way to begin exploring their own use of this capability.

At the outset of the activity, students in each of the EDCI 260 course laboratory sections experience distance learning via the two-way interactive video as learners. Students come to Purdue's Ameritech Distance Learning classroom, a facility located in the Liberal Arts and Education Building and supported by PictureTel digital video equipment and ISDN telephone lines. There they are treated to a program by one of the education content providers available through the Project Athena network. These content providers include the Indianapolis Children's Museum and the Indianapolis Zoo.

After experiencing the distance learning environment as learners, teams of students are assigned to work with a cooperating teacher in the Crawfordsville Schools. Through the interactive video equipment, the students conduct a conference with the teacher to plan a lesson for the teacher's high school class. The students then spend about two weeks to prepare a lesson off line. Finally, on a pre-scheduled date, the student team meets with the Crawfordsville class online and conducts a short distance education lesson. Thus, the students are able to leave the course having not only experienced distance learning as learners but also have planned, implemented, and evaluated a distance learning lesson.

Conclusion

When basic instructional design issues (goals, nature of the subject matter, and needs of the learner) are taken into consideration, different distance learning models may emerge as appropriate for different learning situations. No one method is correct or best. Rather, by applying systematic approaches to the selection of media and methods, we can arrive at appropriate solutions for particular needs. With careful selection, effective distance learning experiences can be constructed for both in-service and pre-service teachers.

Of course, evaluation must be an on-going part of these programs. After a couple of years of experience, for example, we have determined that two-way interactive video may not be necessary for every class in our Northwest Doctoral Program. The rich, reflective dialog which can come from CMC may suit our aims as well or better and at much less cost. So, we are looking to make adjustments. Some of the dialog in the cohort classes will be shifted to CMC while we will use the video for what it does best, allowing for presentations and face-to-face interaction. With clear thinking and a systematic approach, we can continue to take advantage of the exciting opportunities that distance learning provides.

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